

SEAT BELT USE IN NORTH DAKOTA



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Thank you to North Dakota Tourism and Gerald Blank for the use
of the North Dakota picture on the cover.

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EXECUTIVE SUMMARY

The purpose of North Dakota's seat belt use study is to provide statistically reliable data from which generalizations, comparative analyses and recommendations can be developed. The National Occupant Protection Use Survey (NOPUS) provides the North Dakota Department of Transportation (NDDOT) with a system that monitors the seat belt use rates within the state. The National Highway Traffic Safety Administration (NHTSA) funds NOPUS through the NDDOT's Traffic Safety Office.

The sampling methodology for this study was originally developed in 2001 with guidance from NHTSA. It remained stable, with relatively no change in the counties and sites that made up the sample other than to update the site and county vehicle miles travelled (VMT) to the latest NDDOT estimates for the 2009 through 2011 surveys. In April 2011, NHTSA issued new Uniform Criteria for the state observational survey of seat belt use to improve the survey's representativeness. One of the main changes NHTSA implemented was to focus county selection using crash-related fatalities data, as reported by the Fatality Analysis Reporting System (FARS), compared to the population-based exclusion criterion used in the past. The revised criteria, implemented for the 2012 survey and outlined in the Federal Register Vol. 76 No. 63, resulted in changes to the county selection, sites, road type classifications and weighting procedures.

To choose the survey counties, all 53 counties in North Dakota were listed in descending order based on the average number of motor vehicle crash-related fatalities from 2006 to 2010. The top 27 counties accounted for at least 85% of the state's total crash-related fatalities. These 27 counties were then stratified by region based on statistical differences in seat belt use observed in prior surveys between the counties in the western and eastern parts of the state. Therefore, the 27 counties in the sampling frame were stratified according to geographical region with 14 counties in the west and 13 counties in the east. Eight counties were selected from each region using probability proportional to size (PPS) sampling with vehicle miles traveled (VMT) as the measure of size (MOS).

Road segments within each county were then stratified by the MAF/TIGER Feature Class Code (MTFCC) road type and sorted by segment length. A random, systematic sample of 20 road segments was selected using PPS with road segment length by road segment type within each sampled county as the MOS. This represents the second stage of sample selection. This process resulted in the selection of 320 road segments (16 counties x 20 sites per county). Additional sites were also selected for use as alternate sites.

The 2013 survey followed the revised criteria and methodology implemented in 2012. During the week of June 3-9, trained observers visited each site in their assigned counties to collect the seat belt use data as prescribed in the handbook they received at training. Drivers and right front seat passengers in all vehicles with a gross vehicle weight up to 10,000 lbs. were observed for seat belt use.

For the 2013 statewide survey, observers tracked seat belt use for 21,931 drivers and 6,197 right front-seat passengers, for a total of 28,128 vehicle occupants. The estimates of seat belt use were 76.1% for drivers, 81.1% for passengers, and an overall unweighted estimate of 77.2% belted for drivers and passengers combined. Adjusting the raw state rate for the survey design and weights resulted in a weighted state rate of 77.7%.

Males were less likely than females to wear seatbelts (71.5% vs. 86.7%). Male rates were observed to be anywhere from 4% to 35% lower than female use rates for counties surveyed. This trend of higher female seat belt use rates holds for each vehicle type as well – female use ranged from 83.0% to 92.1% over the four vehicle types, while male use ranged from 65.1% to 81.9%. Not controlling for gender, van occupants had the highest seat belt use rate at 86.6% followed by SUVs (83.3%), automobiles (81.4%), and pickups (67.9%).

Although drivers outnumbered passengers by a ratio of more than 3.5:1, passengers buckled up at a rate of 81.1% compared to drivers at 76.1%. This may be mainly due to the fact that drivers are more likely to be men than women (69.4% vs. 30.6%), and their seat belt use rates are much lower than women – 72.2% compared to 85.1% respectively. For passengers, the reverse is true. Women represented 63.1% of the passengers with a use rate of 89.4%, while men represented 36.9% of the passengers with a use rate of 66.8%.

Rates by region indicate occupants in the east are more likely to buckle up (80.7%) than those in the west (73.9%). Regional differences in seat belt use are also reflected by road type. Occupants from the east half of the state had a greater propensity for seat belt use on both local and secondary road types. Occupants from the west, however, registered higher use on primary roads.

NHTSA reports the national average seat belt use rate was 86% in 2012. North Dakota falls below this average with a weighted rate of 77.7%. In general, the findings in the 2013 North Dakota statewide survey are consistent with the findings of previous surveys. However, comparisons to years prior to 2012 should be made with caution because of changes in the sampling methodology implemented last year.

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INTRODUCTION

The Upper Great Plains Transportation Institute (UGPTI), a research and education center at North Dakota State University (NDSU) located in Fargo, ND, was contracted by the North Dakota Department of Transportation (NDDOT) to conduct a field survey of seat belt use in 2013. The study replicates the sampling methodology previously revised and approved by the National Highway Transportation Safety Administration (NHTSA) and the NDDOT for the 2012 survey. Requirements for conducting statewide seat belt surveys are published in the Federal Register, Vol. 76 No. 63, April 1, 2011, Rules and Regulations, pp. 18042 – 18059. The methodology was designed to yield a more statistically valid estimate of the current seat belt use rate on all roadways in North Dakota.

OBJECTIVE

The objective of this study was to determine the rate of seat belt use of drivers and right front-seat passengers in the state of North Dakota.

Additional analyses determined seat belt use rates in the following categories:

- Occupant (driver, passenger)
- Gender (male, female)
- Type of vehicle (automobile, van, sport utility vehicle, pickup/small truck)
- Region of state (east, west)
- Roadway type (primary, secondary, local)

A description of the tasks involved in conducting the 2013 statewide seat belt survey is provided in this report which also includes general information about the methods and protocols. Table 1 summarizes the 2013 survey.

Table 1: Summary of the Seat Belt Use Survey

Methodology	Multistage Stratified Cluster Design with Probability Proportional to Size Sampling
Source of Samples	2011 revised methodology, approved by NDDOT and NHTSA; Westat* supplied list of road segments using 2010 TIGER data developed by the U.S. Census Bureau based on the MAF/TIGER Feature Class Code (MTFCC); three classifications: 1) Primary Roads, 2) Secondary Roads, and 3) Local Roads
Geographic Coverage	State of North Dakota
Identified Regions	East West
Selected Counties	<u>East Region:</u> Barnes, Cass, Grand Forks, Pembina, Ramsey, Richland, Stutsman, Traill <u>West Region:</u> Billings, Burleigh, McLean, McKenzie, Morton, Pierce, Stark, Ward
Number of Sites	320
Survey Period	June 3-9, 2013
Observation Duration Per Site	60 minutes
Sample Size	22,005 vehicles (includes all vehicles where either the driver or passenger or both had a known protection status)

*A research and statistical survey organization

METHODOLOGY OVERVIEW

From 1998 to 2000, the methodology for the observational seat belt survey in North Dakota was based on simple random sampling of 12 counties followed by random sampling of intersections within those selected counties. As a result, the sample produced a strong rural bias by excluding some of the most populous counties with higher traffic density and vehicle miles traveled. Following the 2000 survey, the NDDOT concluded that a new sampling methodology was needed to obtain results that were more representative of traffic patterns and the distribution of drivers and passengers in North Dakota. The NDDOT worked with research methodology experts at NHTSA to review the process.

The methodology from 2001 to 2011 included 16 counties, representing the quadrants of the state, and 319 sites, with approximately half above and half below the mean vehicle miles traveled within each county. This methodology could therefore be described as stratified random sampling modified by the inclusion of what are referred to in the federal guidelines as “certainty” counties. The certainty counties represented about three-fourths of North Dakota’s population and approximately two-thirds of the vehicle miles traveled in the state.

On April 1, 2011, NHTSA published revised Uniform Criteria for the state observational seat belt surveys to provide more accurate data to guide occupant protection programs. The new rule changed many aspects of the survey design. One of these changes was to include counties in the sampling frame based on fatality-based exclusion criterion as opposed to the population-based criterion of the past.

It was determined that 27 counties accounted for at least 85% of North Dakota’s total crash-related fatalities from 2006 to 2010. A subsample of 16 counties was selected for the survey of seat belt use in North Dakota. The counties represent the primary sampling unit. Half of the counties were selected from the western part of the state and the other eight were selected from the eastern half. Within each of those 16 counties a sample of 20 sites were selected providing a total of 320 site locations across the state. If any original sites could not be observed due to unforeseen circumstances, a reserve sample of sites was also selected. The sites within the counties are the secondary sampling unit. The sites were stratified by road types, identified within three MAF/TIGER Feature Class Code (MTFCC) classifications: primary roads, secondary roads, and local roads.

The formulas contained in this report use the following definitions.

g – denotes the strata (east or west)

c – denotes the county

h – denotes the road segment strata (primary, secondary, or local)

- i – denotes the road segment
- j – denotes the time segment
- k – denotes the vehicles direction of travel
- l – denotes the lane of observation
- m – denotes the vehicle
- n – denotes the front-seat occupant (driver or passenger)

Within each stratum, east and west, counties were selected with probability proportional to size (PPS) with the measure of size (MOS) being vehicle miles traveled (VMT). If we let $g = 1,2$ be the first stage strata, v_{gc} be the VMT for county c in stratum g , and $v_g = \sum_{all\ c\ in\ g} v_{gc}$ be the total VMT for all counties in first stage stratum g , then the PSU inclusion probability is: $\pi_{gc} = n_g v_{gc} / v_g$, here n_g is the PSU sample size for first stage stratum g that was allocated. First each strata was analyzed to identify if any certainty counties existed. A county was selected with certainty if its MOS was equal to or exceeded v_g / n_g . Each certainty county identified was set aside and the stratum MOS was reduced by that county's VMT and n_g was reduced by one. This process was repeated until no county's MOS was equal to or greater than v_g / n_g based on the reduced values for v_g and n_g . The probabilities of selection for the remaining counties in the stratum were calculated based on the new values for v_g and n_g . Three certainty counties were identified in each region. Burleigh, Ward, and Morton counties were selected with certainty from the west region, while Cass, Grand Forks, and Stutsman counties were selected with certainty from the east region. The remaining counties for each region were selected using the SAS 9.2 procedure PROC SURVEYSELECT based on the re-calculated probabilities of selection.

Next, road segments within each county were implicitly stratified by its MTFCC - primary, secondary and local. The list of eligible road segments within each county was then sorted by segment length within each MTFCC group to obtain an ordered list. Road segments were selected with PPS using length as the MOS. The same procedure that was used to identify certainty counties was used to identify any certainty sites. With no certainty road segments being identified, a sampling interval (I) was calculated as the total length across all remaining road segments within the county divided by the number of road segments to select within each county (i.e. 20 less the number of certainties). A random start (RS) was selected between 0 and I, which determined the first road segment selected. Subsequent road segments selected were determined by adding multiples of I to RS until the desired number of road segments was selected and/or the end of the sorted list was reached.

Once the sites were chosen, a random order of the sites to observe within each county was constructed. One of the sites in each county was randomly chosen as the starting site. This site was then randomly

assigned to one of the 77 one-hour time slots within the week as mandated by the Uniform Criteria. The time slots cover Monday through Sunday from 7 a.m. to 6 p.m. Once the initial site was selected and assigned to a time slot, the remaining sites were clustered and arranged within the county to achieve administrative and economic efficiencies. After each site was identified, the direction of travel was chosen randomly as either N/W or S/E. The lane of traffic was chosen as the closest lane to where the observer could find a suitable and safe place to make observations.

Under the stratified multistage sample design, the inclusion probability for each observed vehicle is the product of selection probabilities at all stages:

π_{gc} for county, $\pi_{hi|gc}$ for road segment, $\pi_{j|gchi}$ for time segment, $\pi_{k|gchij}$ for direction, $\pi_{l|gchij}$ for lane, and $\pi_{m|gchijl}$ for vehicle.

So the overall vehicle inclusion probability is:

$$\pi_{gchijklm} = \pi_{gc}\pi_{hi|gc}\pi_{j|gchi}\pi_{k|gchij}\pi_{l|gchij}\pi_{m|gchijl}.$$

The sampling weight (design weight) for vehicle m is:

$$w_{gchijklm} = \frac{1}{\pi_{gchijklm}}$$

Noting that all front-seat occupants were observed and letting the driver/passenger seat belt use status be:

$$y_{gchijklmn} = \begin{cases} 1, & \text{if belt used} \\ 0, & \text{otherwise} \end{cases}.$$

Then the seat belt use rate estimator is a ratio estimator calculated as follows:

$$\rho = \frac{\sum_{all\ gchijklmn} w_{gchijklm} y_{gchijklmn}}{\sum_{all\ gchijklmn} w_{gchijklm}}.$$

This estimator captures traffic volume and vehicle miles traveled through design weights (which will include nonresponse adjustment factors) at various stages and it does not require knowledge of VMT/DVMT.

The weighted average seat belt use rate for North Dakota calculated using this estimator was found to be 77.7% for 2013. This compares to the 2012 weighted rate of 80.9%.

Standard Error and Confidence Intervals

The standard error of the state seat belt use rate measures the amount of random sampling error in the survey results. The smaller the standard error, the more accurate the seat belt use rate when compared to the true, but unknown, seat belt use rate for North Dakota. Assuming the design of the survey accurately measures the variable of interest, the larger the survey sample the more accurate the results.

The estimated standard error for the state seat belt use rate is found by taking the square root of the variance, so

$$SE(\hat{p}_s) = \sqrt{V(\hat{p}_s)}$$

Where:

$SE(\hat{p}_s)$ = the estimated standard error for the state seat belt use rate

$V(\hat{p}_s)$ = the estimated variance for the state seat belt use rate

\hat{p}_s = the estimated state seat belt use rate

Using SAS callable SUDAAN statistical software, the standard error for the state seat belt use was calculated to be 0.86%. From this, we can build a 95% confidence interval for the state seat belt use. The 95% confidence interval formula is $\hat{p}_s \pm 1.96 * SE(\hat{p}_s)$, where each of the terms has the meaning above and the value 1.96 is the tabled value from the standard normal distribution for a 95% confidence interval.

Table 2: Confidence Interval

95% Confidence Interval and Estimated Standard Error for the 2013 State Seat Belt Use				
Occupants	State Rate	Standard Error	95% CI Lower Limit	95% CI Upper Limit
28,128	77.7%	0.86%	76.0%	79.3%

The 95% confidence interval means that statistically there is only a 5% chance that the actual statewide seat belt percentage falls outside the range of 76.0% to 79.3%.

Nonresponse Rate

A factor that could potentially bias the results and invalidate the survey is exceedingly high nonresponse rates. A nonresponse occurs when the observer tries but cannot determine an occupant's seat belt use. As

stipulated in NHTSA's guidelines, the nonresponse rate (4.93%) did not exceed 10% over the entire survey. Had the rate exceeded the allowable maximum, individual counties that registered above the 10% threshold would have been revisited to observe additional vehicles.

Protocols

Observers

Observers were contracted to conduct the 2013 seat belt survey and were required to participate in in-house training and accuracy testing prior to conducting the field observations. Additionally, each observer completed Institutional Review Board (IRB) training, as required by North Dakota State University. All observers were required to have good driving records with proof of adequate vehicle insurance if not using state fleet vehicles, and were required to wear seat belts while conducting observations.

Observational Protocols

The observational protocols used in the 2013 study adhere to the recent changes to the Uniform Criteria as outlined in the Federal Register.

Observations were conducted Monday through Sunday. The day of the week and time of day were randomly chosen for one site within each county. The remaining sites within each county were arranged based on the first site to minimize travel and costs. This predetermined order of observation sites to be visited each day was provided to each observer at training. A complete list of county observation sites are found in Appendix A of this report. The traffic direction of vehicles to be observed was randomly chosen in advance and was limited to one direction.

An 11-hour block of daylight, from 7 a.m. to 6 p.m., was identified as the observational period. Each site observation occurred in a predetermined time slot, requiring a 60-minute observation period beginning at the first 5-minute interval after arrival at the site, and ending exactly 60 minutes later.

Traffic Conditions and Data Collection Problems

Observers were trained to cope with traffic problems in the following manner:

- When traffic was heavy and there were too many vehicles to count visually, recording was done as long as possible and then stopped until the observer could catch up with observations. Some

vehicles were, of necessity, outside the sample. When this occurred, counting resumed after no more than a one-minute pause. Once an observer's eyes were locked on a vehicle, a count of that vehicle was required on the observation form.

- At sites with more than one lane of traffic in the predetermined direction, observations were made from the lane closest to the observer, unless traffic volume/flow allowed for observation of both lanes of traffic.

Site Accessibility Problems

Field observers could terminate observations at a preselected site if any of the following circumstances arose: (1) weather conditions that would hinder the accuracy of the observations; (2) heavy traffic flow that might endanger the safety of the observer; or (3) road conditions that rendered observations unfeasible, such as road construction, detoured traffic, or a crash site. In these circumstances, observers were directed to contact the project coordinator immediately for assignment of an alternate site if a suitable vantage point could not be established.

Observed Vehicles

All vehicles with a gross vehicle weight up to 10,000 lbs. were observed and classified on the observation form as cars, vans, sport utility vehicles, and pickups (includes other small trucks, i.e. flatbed, utility service, and small box trucks, etc.) Large trucks (semi or large box), large emergency vehicles (ambulance/fire), and RVs/motor homes were not included in the survey.

Observations

Type of vehicle, gender characteristics and seat belt use were recorded for both drivers and right front seat passengers. Observations occurred from within the observer's vehicle whenever possible. The observer was parked as close as possible to the road for accurate observation without compromising observer safety. If observations could not be conducted from within the vehicle, the observer was allowed to stand off the roadway and required to wear an ANSI-approved Type-2 safety vest to enhance visibility of the observer.

Problems Encountered by Observers

Some observers encountered site issues related to road construction and road segments that were ineligible for inclusion. In these cases, the observer was directed to move to an alternate site fitting the protocols. Complete information on site locations is found in Appendix A.

QUALITY ASSURANCE

Observers

In preparation for the observation survey work, observers completed training on protecting the rights and welfare of research participants as required under NDSU policy. Subsequently, observer training sessions were held at two sites, with observers required to attend one of the two sessions. All observers were required to participate in the classroom instruction and field training. Each observer was tested through participation at two observation test sites to acquire an inter-observer agreement ratio.

Test sites were selected to represent the types of sites and situations observers could expect to encounter in the field. No actual sites in the sample of roadway segments were used as test sites. During field training, observers recorded data independently on separate observation forms. Each observer documented vehicle type, gender, and seat belt use of both drivers and right front seat passengers. Individual observations were then compared to the group to calculate the agreement rate. All agreement rates were sufficiently high and no additional training was required.

Data Entry

Steps were taken to ensure quality control with respect to data entry. Each site packet was checked to ensure the number of observation sheets submitted was the same as that noted by the observers. Database records were verified to match the number of observations. An accuracy check was done on a systematic sample of records and was measured at greater than 99.9% for every field. Errors discovered during quality assurance checks were corrected prior to completion of all analyses.

RESULTS

Sample Size by Year

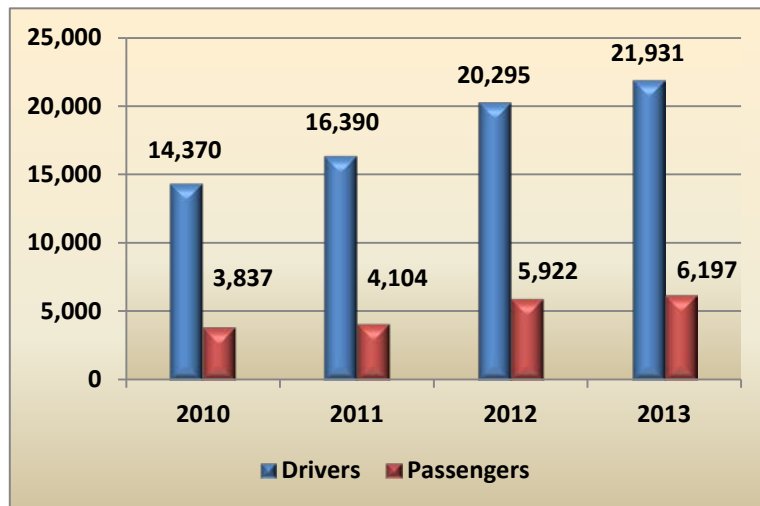


Figure 1: Driver and Passenger Observations, 2010 - 2013

Increases in sample size shown in Figure 1 can be explained by extended observation times. From 2010 to 2011, an extension of an additional half hour was permitted at sites with low traffic activity if a minimum threshold of acceptable observations was not achieved within the first thirty minutes. In 2012, observation times at all sites were extended to one hour to provide an adequate sample size to comply with standard error stipulations. Even with extended observations times, several individual sites did not capture the number of observed vehicles expected to represent a stand-alone, statistically valid sample at the site level. However, these sites contribute to the aggregate measurement of statewide and county seat belt use. Complete details on numbers of observations and use by site are found in Appendix E. The sample size of each annual seat belt survey from 2003 to 2013 is found in Figure 2.

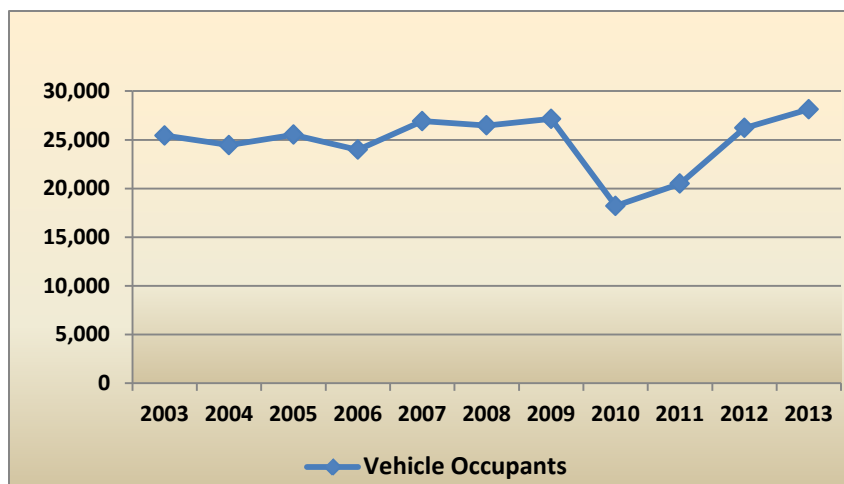


Figure 2: Vehicle Occupants, 2003 - 2013

Statewide Results

The overall unweighted results of the 2013 statewide survey indicate 77.2% of vehicle occupants were observed to be wearing seat belts on North Dakota roads. Because the survey employs a two-stage stratified random sampling scheme, a more appropriate estimate of the seat belt use rate is found by weighting the unadjusted rate using the formulas from the methodology section. Using those formulas, the overall weighted seat belt use rate in North Dakota is 77.7% for 2013.

One influence on the overall rate is the driver to passenger ratio. In 2012, there were 3.4 drivers for every passenger. The ratio is similar this year at 3.5 (Table 3).

Table 3: Driver Passenger Ratio, 2012-2013

	2013	2012	Difference
Ratio			
Drivers:Passengers	3.5	3.4	+0.1
Drivers as % of Sample	78.0%	77.4%	+0.6%

County Results

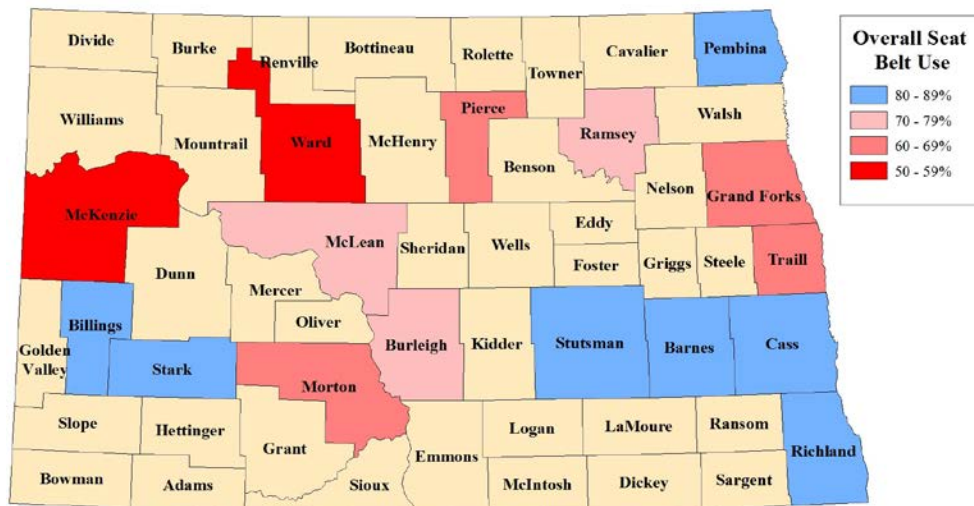


Figure 3: Total Seat Belt Use, Weighted

Weighted seat belt use rates for all vehicle occupants in the 16 counties included in the sample are mapped in Figure 3, as well as by descending order of use in Figure 4. Belt use ranges from a low of 54.4% in McKenzie County to a high of 88.4% in Pembina County. Approximately one-third of surveyed

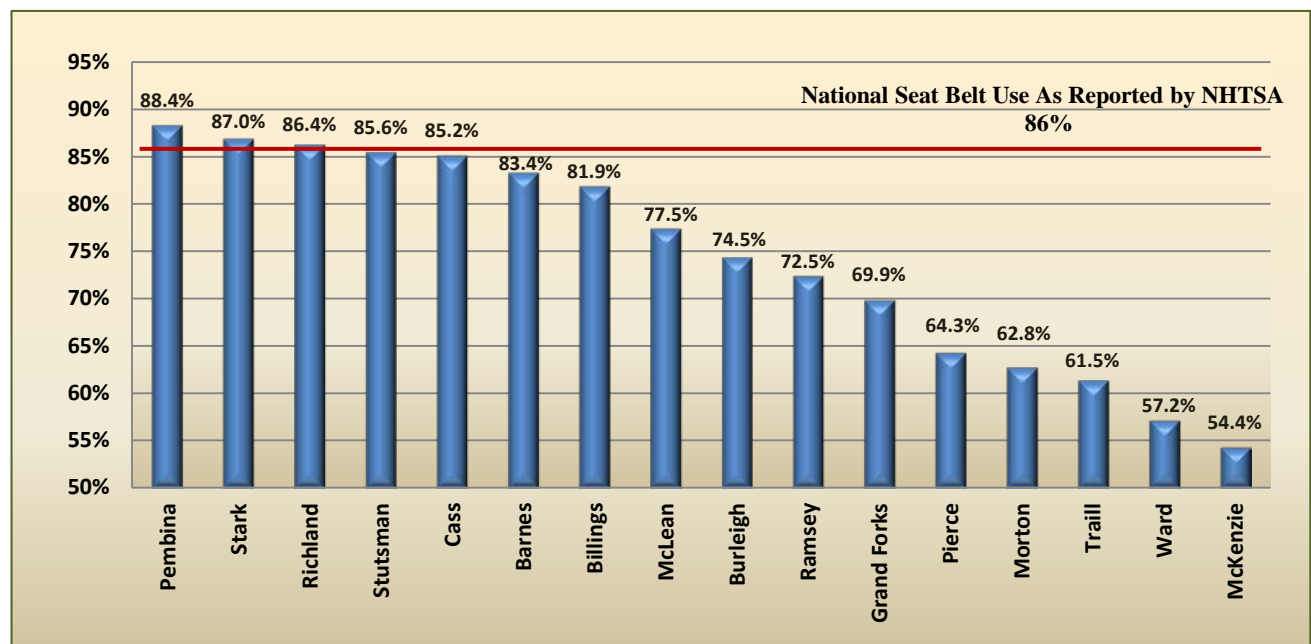


Figure 4: Seat Belt Use by County, Weighted

counties have use rates roughly at or above the national rate reported by NHTSA. Use rates can vary considerably from year-to-year and it is best to be cautious in interpreting changes from one year to the

next at the county level. The changes can often represent sampling difference and are not likely to be statistically significant, especially for counties where there are few total observations. However, even the rates for counties with more observations may be volatile from year-to-year.

Results for Vehicle Occupants

The unweighted estimates of seat belt use are 76.1% belted for drivers, 81.1% belted for passengers, with an overall estimate of the seat belt use rate of 77.2% for drivers and passengers combined (Figure 5).

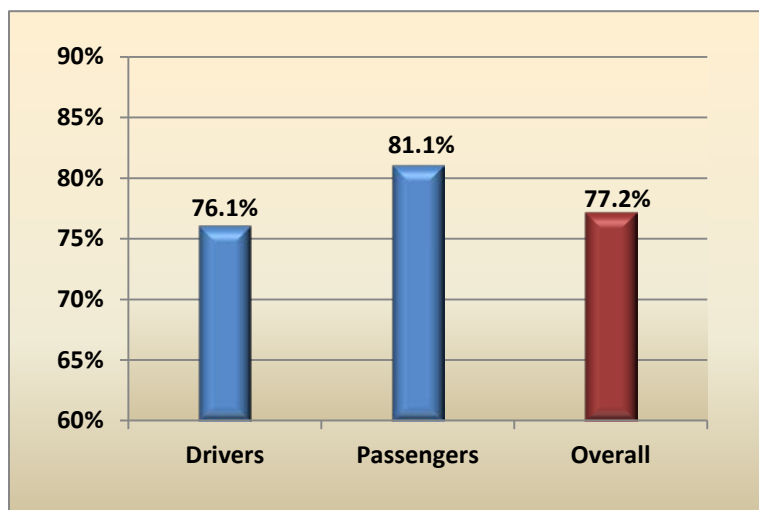


Figure 5: Percent Belted by Vehicle Occupant, Unweighted

In 2013, driver seat belt use was highest in Stark County at 87.1% (Figure 6). In addition to Stark, several other counties had driver use above 80%: Cass – 85.3%, Pembina – 85.0%, Stutsman – 83.7%, Richland – 82.9%, Billings – 82.8%, and Barnes – 80.2%. McKenzie and Ward Counties lagged in driver use at less than 60%.

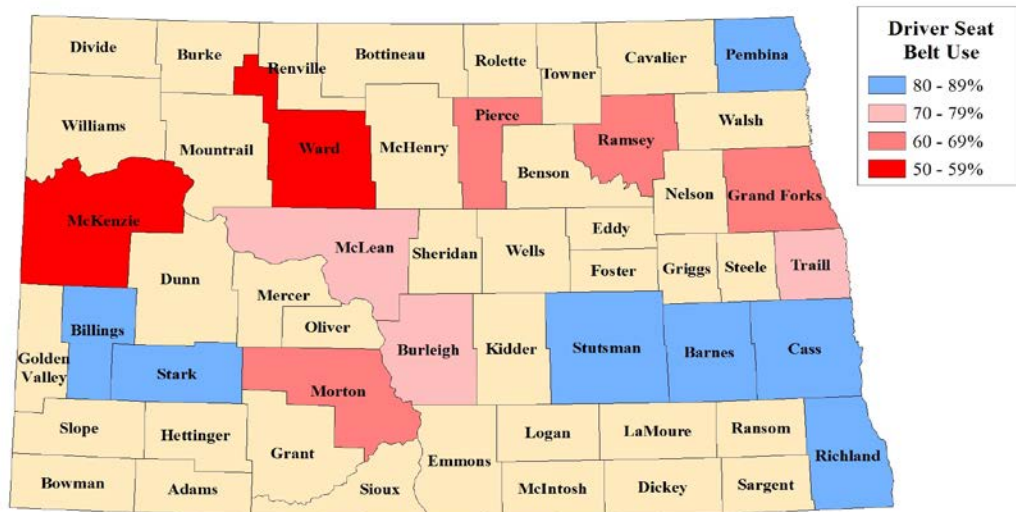


Figure 6: Driver Seat Belt Use

Passenger use outpaces driver use in all but two of the counties surveyed - Burleigh and McKenzie counties have lower passenger than driver use rates. Passenger rates range from a low of 51.6% in McKenzie County to a high of 96.1% in Richland County (Figure 7).

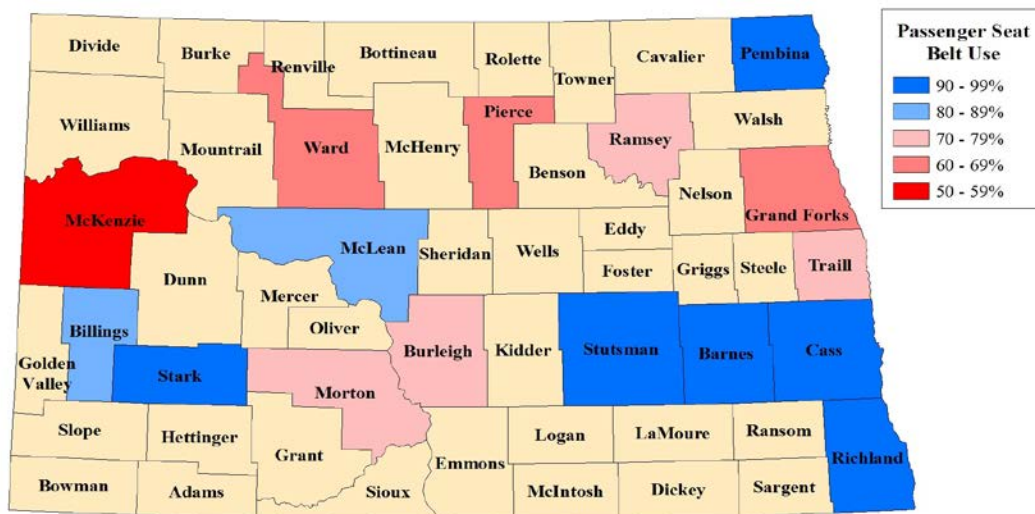


Figure 7: Passenger Seat Belt Use

Considerable effort has been made to address seat belt use in North Dakota. The rate of 77.7% realized this year is lower than the national average of 86% (2012) reported by NHTSA. Experiences from other states would suggest that some impetus to cause a major shift will be necessary to achieve significant increases in seat belt use. One possibility would be enactment of a primary seat belt law which NHTSA suggests would change seat belt use rates by 10% to 15%. Another related possibility is heightened enforcement across the state.

Some factors that may be useful in discussions about increasing seat belt use in North Dakota are found in the remainder of this report, which focuses on differences in seat belt use among regions of the state, gender, vehicle type, and roadway type.

Results by North Dakota Regions

The 2013 survey sampling methodology groups the state into an east/west regional division. Both east and west regions contain three “certainty” counties and five additional selected counties from the remaining counties in each region.¹ The results for the 2013 survey indicate a relatively even distribution of observations with 14,329 collected in the west and 13,798 in the east. The sampling distribution by region is illustrated in Figure 8.

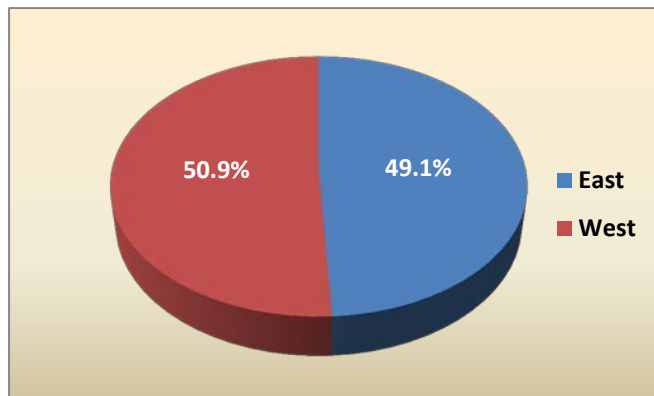


Figure 8: Sample by Region

Rates of seat belt use were higher in the east (80.7%) than the west region (73.9%). Figure 9 illustrates regional results for all vehicle occupants for 2013.

¹ See the discussion of the sampling methodology for details on certainty counties and the selection processes.

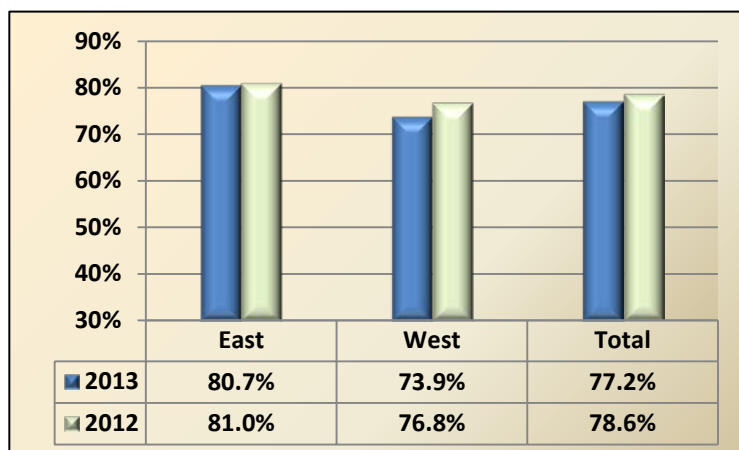


Figure 9: Percent Belted by Region, Unweighted

Results by Vehicle Type

Beginning with the 2012 statewide seat belt survey, North Dakota incorporated the expanded Uniform Criteria vehicle eligibility which included all passenger vehicles with a gross vehicle weight up to 10,000 pounds. This change necessitated the inclusion of various small trucks (i.e. flatbed, utility service, and small box trucks, etc.) These additional truck observations are hereafter included in the “pickup” category to prevent confusion with larger truck activity.

In general, vehicle distribution in the sample is consistent with 2012. Only marginal variations in share are noticed with slight increases in trucks and SUVs, and corresponding decreases in automobiles and vans. Truck observations represent the largest share of vehicle type (37.4%) in the sample (Figure 10). This departure in the historical sample distribution of vehicles where traditionally automobiles held the largest share is likely explained by the expansion of eligible vehicle types that occurred with the implementation of the new methodology in 2012. As well, pickup use in the western region, influenced by the continued development of the oil industry, may contribute to the increased number of truck observations. Whereas the east/west regions hold an approximately equal share of the overall sample in 2013, pickups represent 45.9% of vehicles in the west, while only 28.6% in the east. At the county level, this disproportionate share of pickups in the West region is most noticeable in McKenzie county which recorded a share of 78.6%.

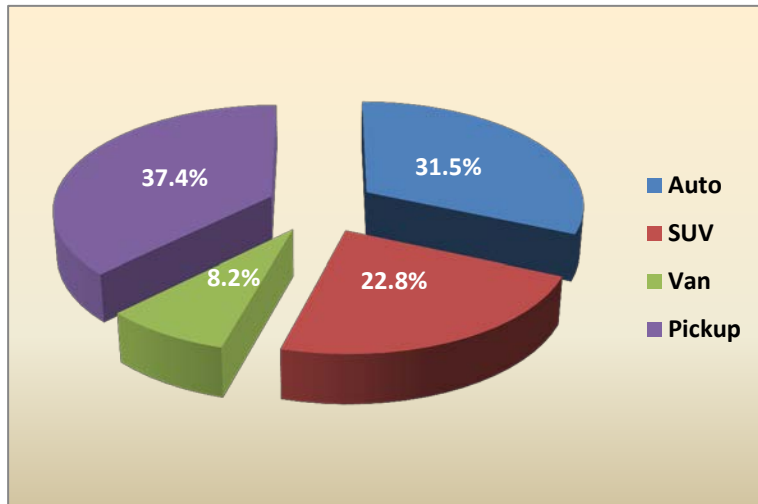


Figure 10: Composition of Sample by Vehicle Type

Seat belt use in all vehicle types is stable from 2012 to 2013 with only slight differences observed. Overall use rates for all vehicle types are higher than the unweighted 2013 statewide rate of 77.2% with the exception of pickups. Pickup occupants observed seat belt use rates are considerably lower than the rates in other vehicle types, and 12% lower than the overall unweighted state rate. This demographic (pickups) typically demonstrates lower seat belt use and this use rate, coupled with its share of the sample, can reduce the overall rate. These 2013 results are consistent with long-term trends for seat belt use in North Dakota and other states that are largely rural and have a high frequency of pickup trucks.

The results for overall seat belt use by vehicle type are presented in Figure 11. Maps detailing seat belt use by county and vehicle type are found in Figures 12 through 15.

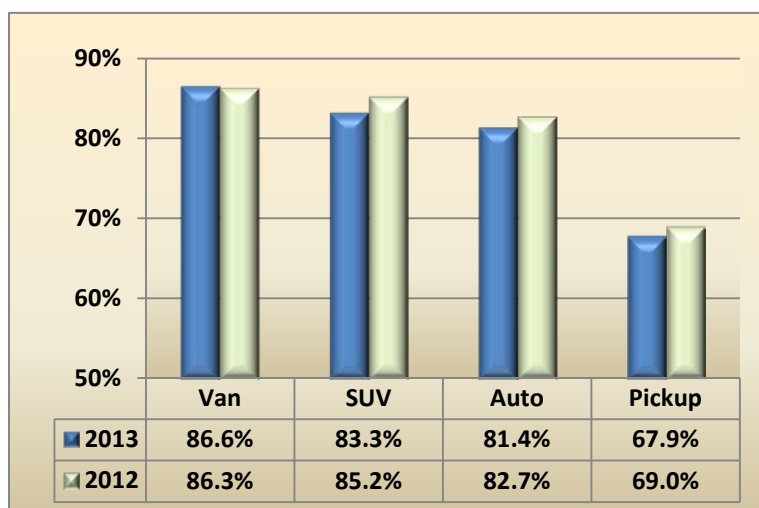


Figure 11: Percent Belted by Vehicle Type for All Occupants, Unweighted

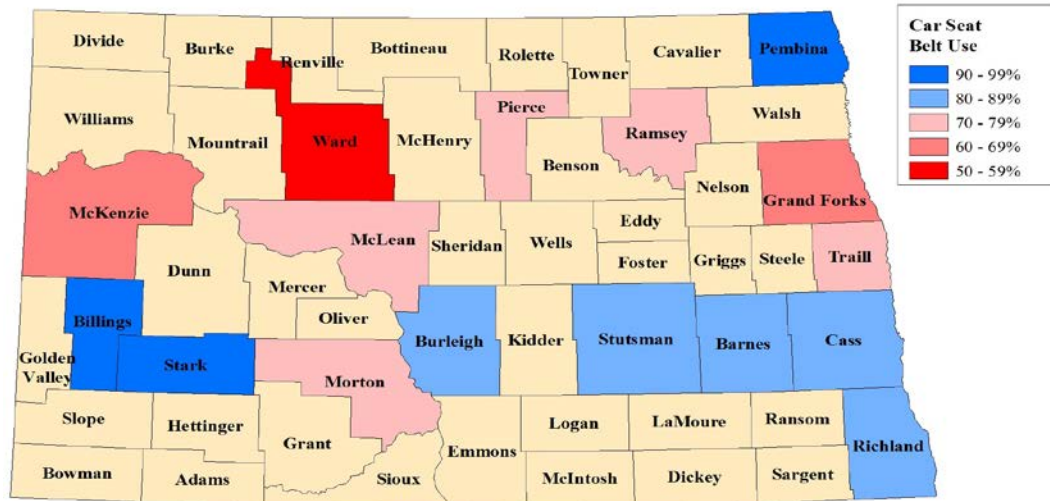


Figure 12: Automobile Seat Belt Use

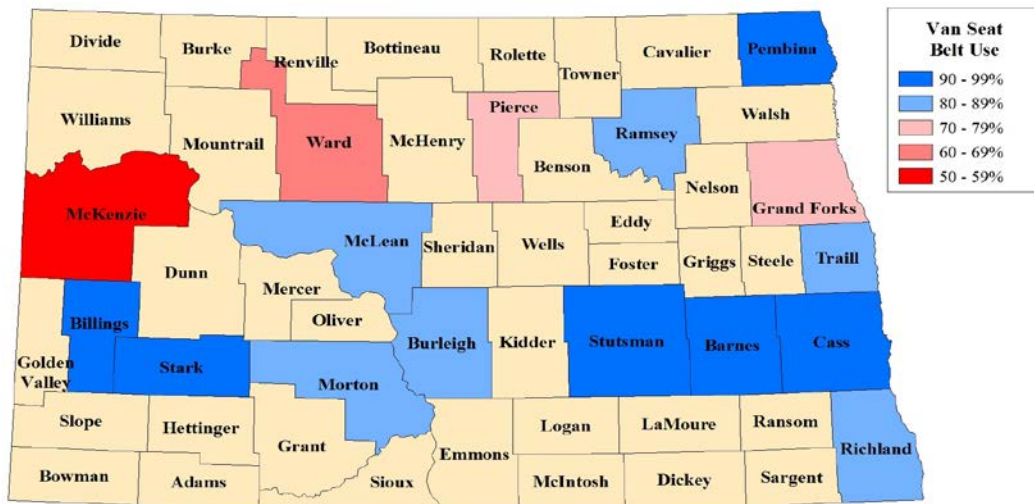


Figure 13: Van Seat Belt Use

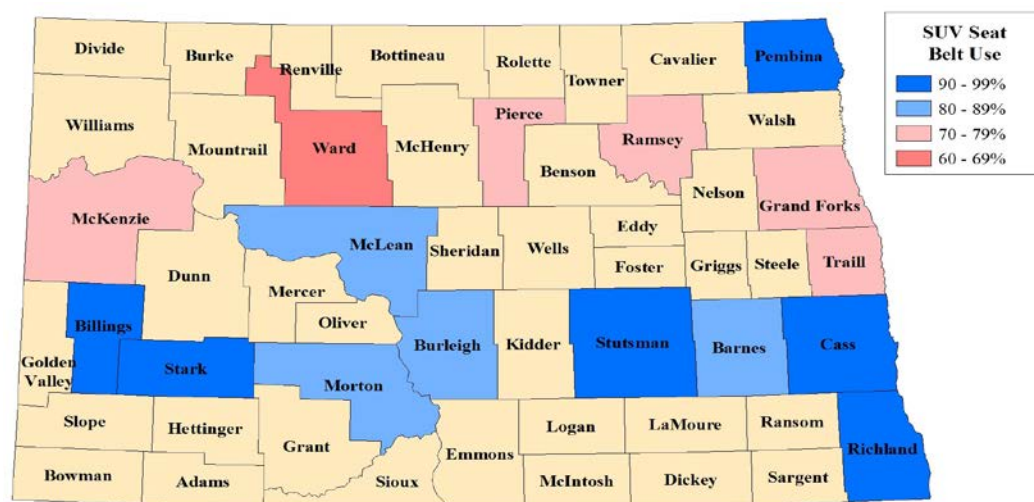


Figure 14: SUV Seat Belt Use

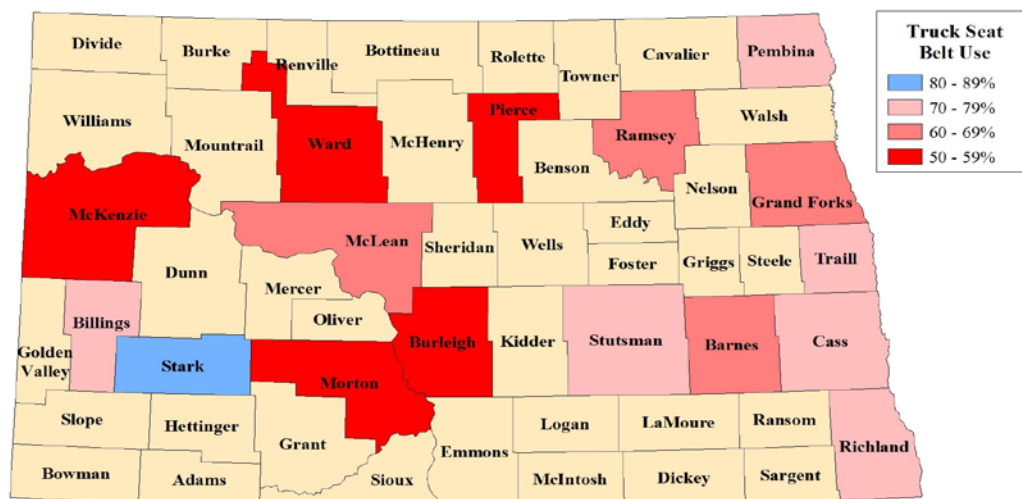


Figure 15: Pickup Truck Seat Belt Use

Gender and Seat Belt Use

The results for gender and seat belt use in 2013 are consistent with the results of prior surveys. Males make up more of the driver sample, by approximately 2:1, but a much smaller proportion (.06:1) of passengers. Overall, males represent 62.2% and females 37.8% of the 2013 sample (Figure 16). In a small percentage of observations, occupant gender was unable to be determined, but occupant protection was still recorded. These cases are included in all of the analyses except where gender is one of the variables of interest. Removing these observations for these parts of the analyses has no effect on the overall numbers, but is mentioned here for comprehensive reporting.

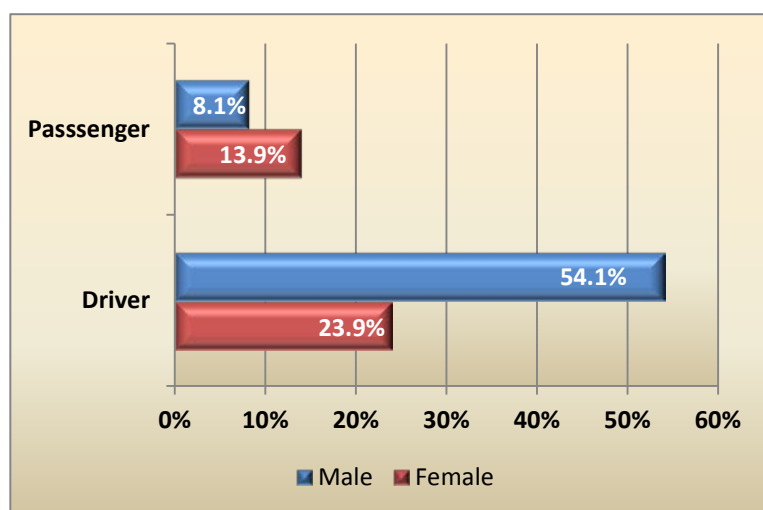


Figure 16: Percent of Sample by Gender & Vehicle Occupant

Females, regardless of occupant position, consistently demonstrate more frequent seat belt use than males (Figure 17). Female passengers lead seat belt use rates at 89.4% followed closely by female driver use rates of 85.1%. For males, driver use is higher than passenger use (72.2% and 66.8%).

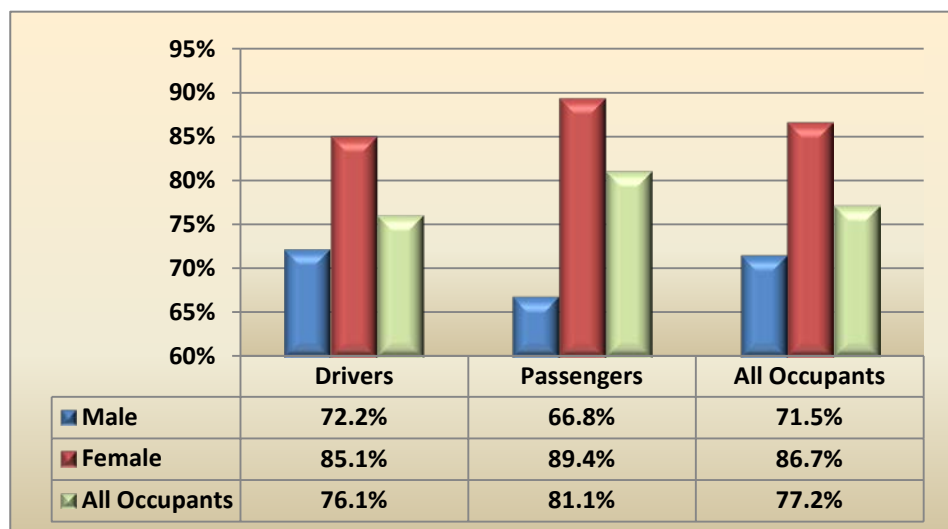


Figure 17: Belted by Gender & Vehicle Occupant

The following maps (Figures 18 and 19) show both genders exhibit greater seat belt use in the eastern half of the state. However, disparity in belt use by gender is also observed within regions. In two-thirds of counties in the east, rates of use for female occupants is greater than 90%, whereas male use is above 80% in just over a third of counties in this region. In the west region, three-fourths of the counties have female use above 80% and the same proportion of counties with male use below 70%.

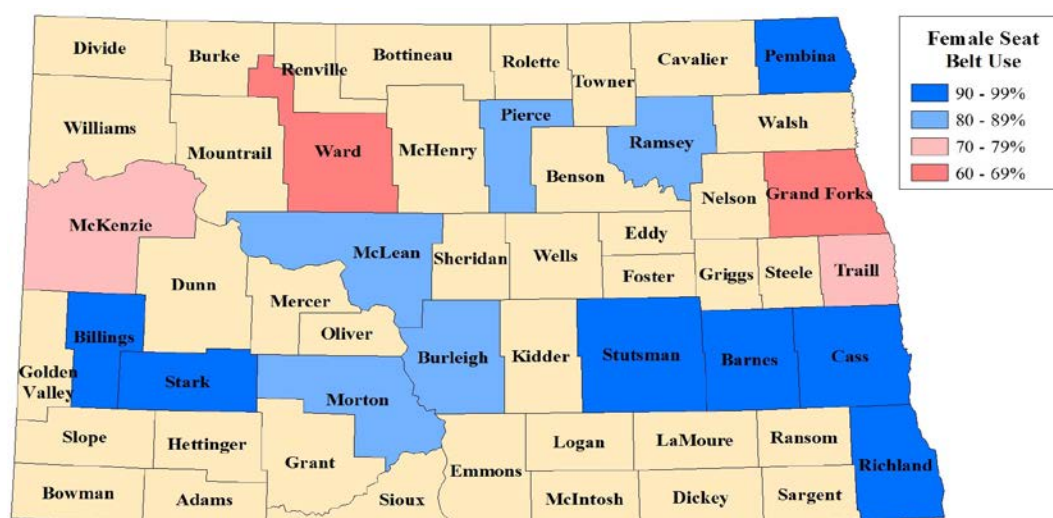


Figure 18: Female Seat Belt Use

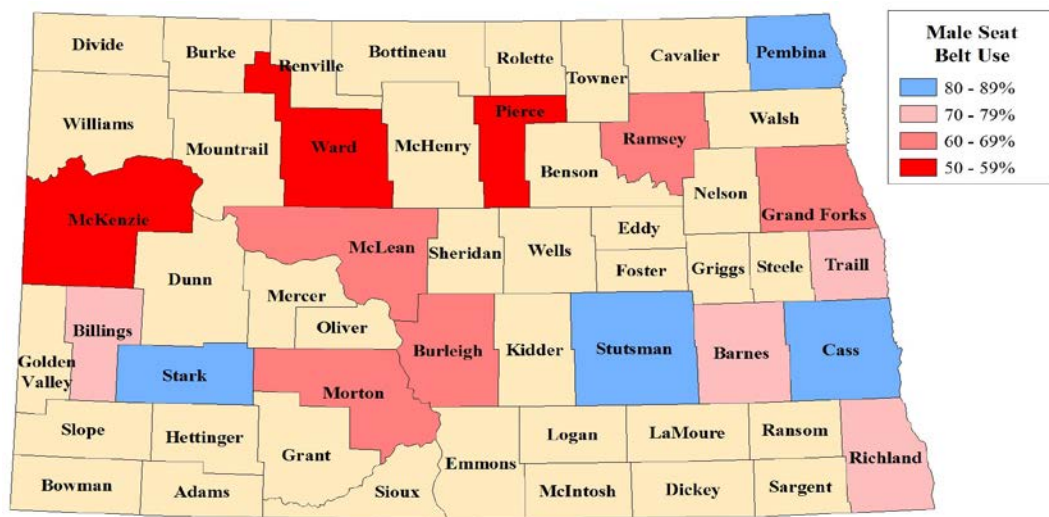


Figure 19: Male Seat Belt Use

Gender and Vehicle Type

When considering the data without respect to the driver/passenger demographic, males have lower representation in cars and SUVs. The greatest disparity shows males with a larger than 80% share of the sample in the pickup vehicle type. The gender breakdown of the other vehicle types is fairly uniform. The distribution of vehicle occupants by gender, expressed as percentages of the sample, are illustrated in Figure 20.

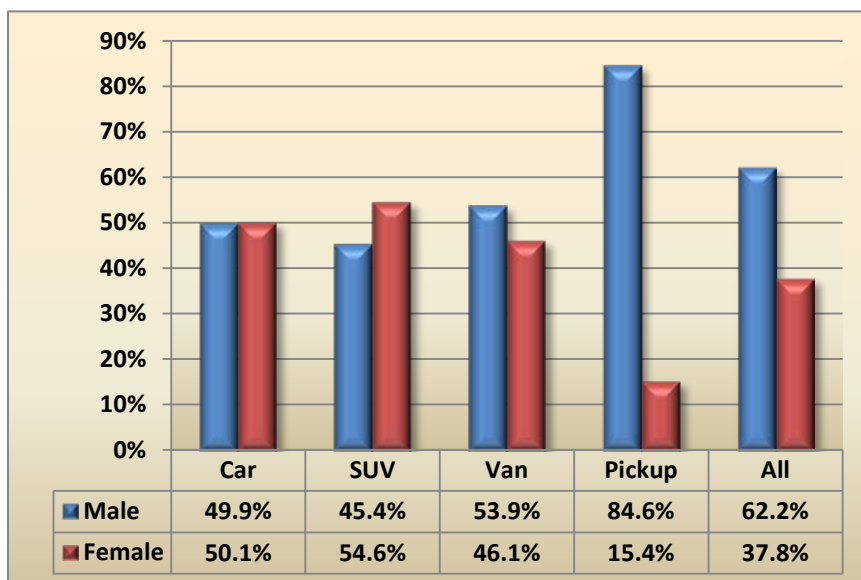


Figure 20: Percent of Sample by Vehicle Type & Gender

In general, female seat belt use rates are consistently high across all types of vehicles, at least 83.0%, although the size of the gender difference varies (Figure 21). The male rates are more varied with ranges of use between 65.1% (pickup) to a high of 81.9% (van). Although both male and female observed use is lowest in pickups, the male rate drops off precipitously to 65.1% versus 83.0% for females. Female seat belt use is higher than the unweighted state rate (77.2%) across all vehicle types, whereas, male seat belt use outpaces the state rate in vans and SUVs only.

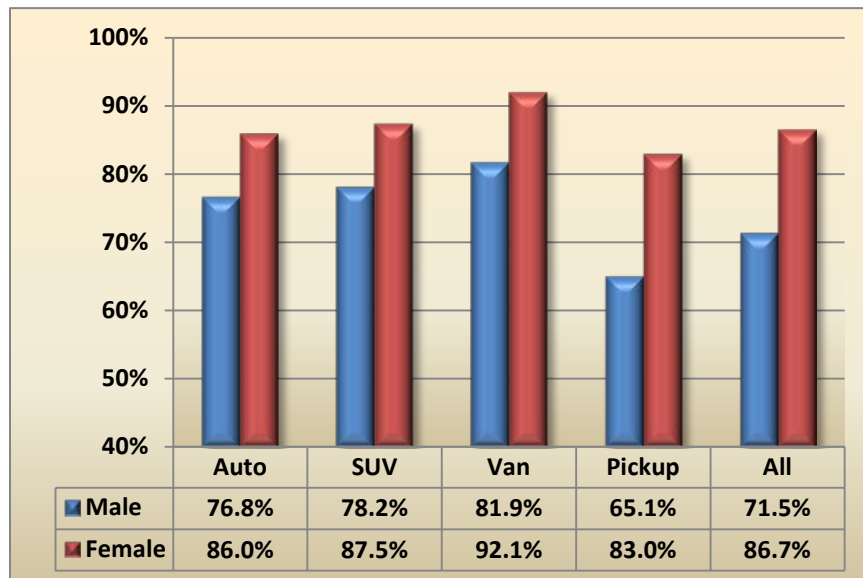


Figure 21: Belted by Gender & Vehicle Type

Results by Roadway Type

Roadways are classified into three road types and broadly described as follows:

- Primary Road – divided, limited-access, i.e. interstates
- Secondary Road – main arteries usually in U.S./State/County highway system
- Local Neighborhood Road/Rural Road/City Street – paved, non-arterial streets

Comprehensive definitions of road type are provided in Appendix F. In the 2013 survey, primary, secondary and local roadways accounted for 42.9%, 45.8%, and 11.3% of the vehicle occupants respectively (Figure 22).

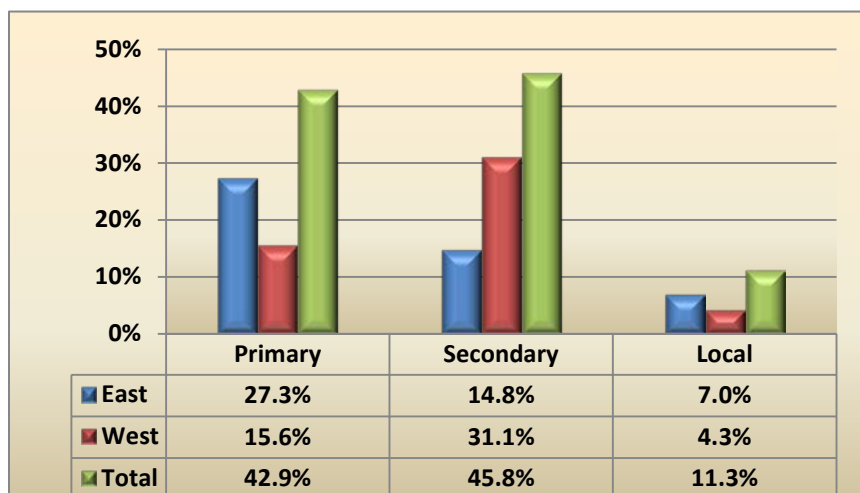


Figure 22: Percent of Sample by Roadway Type

Differences in seat belt use rates are found across the road types. It is typical in North Dakota to find that vehicle occupants on interstate roadways have the highest rates of seat belt use, and this was again evident in 2013. Overall, vehicle occupants on primary roads were belted at a rate considerably higher than the rates for local and secondary roads (Figure 23). Seat belt use stratified by region and roadway type reveals that east/west use is relatively consistent on all road types. The west half of the state demonstrates slightly higher use on primary roads, while a similar disparity is seen on secondary and local roads in the east region.

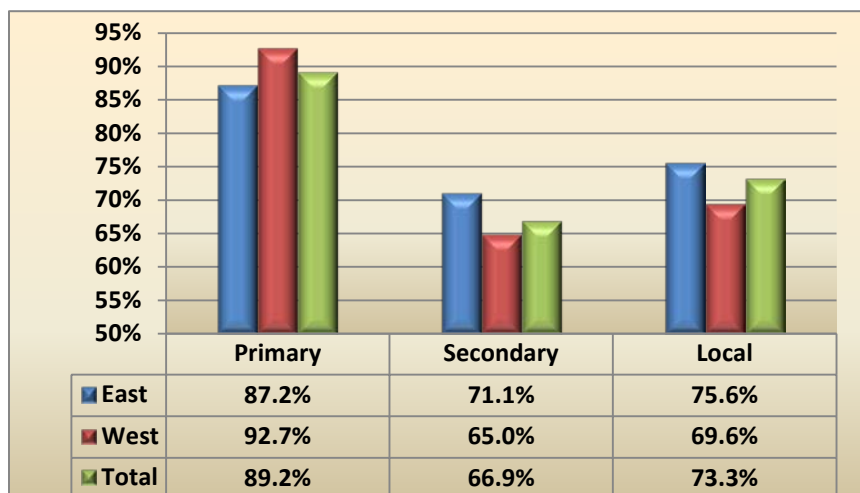


Figure 23: Seat Belt Use by Roadway Type

SUMMARY

Observers collected data on seat belt use for 21,931 drivers and 6,197 right front-seat passengers, for a total of 28,128 vehicle occupants. The observations were collected at 320 sites across 16 counties. Based on the sampling methodology weighting procedures, the final estimate for the statewide seat belt use was 77.7% belted. Experiences from other states would indicate that improvement in seat belt use will likely only occur through some type of significant change such as implementation of a primary seat belt law, increased funding for additional enforcement, or possibly higher fines (NHTSA).

A summary of major findings regarding seat belt use in North Dakota for 2013 are:

- **Region.** In 2013, rates of seat belt use were higher in the east region overall – 80.7% versus 73.9% respectively. The driver population from the east recorded a rate of 78.9% compared to 73.6% in the west. There was a larger disparity between regions in the passenger population where use rates were 86.0% in the east and 75.2% in the west.
- **County.** Pembina, Stark, and Richland counties all registered seat belt use above the national average. Pembina had the highest use rate of 88.4% followed closely by Stark and Richland – 87.0% and 86.4% respectively. Of the 16 counties observed, Ward and McKenzie were observed to have seat belt use less than 60%.
- **Vehicle Type.** The results of the 2013 statewide survey indicate that rates of seat belt use were above the unweighted statewide average in every vehicle type except pickups. Seat belt use among pickup occupants continues to depress the overall rate in North Dakota due to the fact that these occupants made up 37.4% of the sample and the use is low – 67.9% overall, with male occupants at 65.1%.
- **Gender.** Female occupants had much higher rates of seat belt use than male occupants (86.7% and 71.5% overall). Higher rates hold for females whether they are drivers or passengers. The lowest rate for female occupants is 67.3% in Ward County whereas the lowest rate for male occupant use is 53.5% in Pierce County. Females consistently have higher rates when compared to males not only in North Dakota, but across the nation.
- **Gender and Vehicle Type.** Females had higher rates of seat belt use than males for every vehicle type. Female rates were relatively high even in pickup trucks. The highest rate for males was found in vans, 81.9%, and the lowest in pickups, 65.1%. By comparison, female rates were more consistent across vehicle types, ranging from 92.1% in vans to 83.0% in pickups.

- **Road Type.** Secondary roads held the largest share of occupants in the sample (45.8%), followed by primary roads (42.9%). Local roads had the smallest share (11.3%). Frequency of seat belt use was highest on primary roads (89.2%) followed by local roads (73.3%) and secondary roads (66.9%).